31. The method as in claim 21, wherein said step of controlling a removal device comprises actuating any combination of a plurality of air ejectors disposed across the path width of the mass of moving products.

32. The method as in claim 21, further comprising scanning the products with a visible color light beam and receiving the visible reflected light with a respective detector that generates a signal proportional thereto, and using the signal to sort the products by specific visible light differences.

## REMARKS

Claims 1 through 32 are pending in the application, with claims 1, 14, and 21 being independent claims.

Claims 1 through 6 and 13 through 20 stand rejected under § 103(a) in view of Reimer '086.

Claims 7 through 9 and 21 through 32 stand rejected under § 103(a) as unpatentable over Reimer '086 in view of Lockett '062. Claims 10 through 12 stand rejected under § 103(a) as unpatentable in view of Riemer '086 and Tsuji '985. Applicants respectfully submit that the claims as presented herein patentably distinguish over the various cited references.

The present invention is fundamentally different from the visual inspection system of Riemer '086. The invention is premised on the operational principles of directing a concentrated light beam onto objects to be scanned such that two different detectable light components are generated. Direct reflected light is generated from the point of impingement of the concentrated light beam on the products and diffuse reflected light is generated from the area of the products around the impingement point

due to diffusion of the light beam into the products. The concentrated light beam is directed towards a scanning zone in a scanning pattern such that the products moving through the width of the scanning zone are impinged upon by the light beam as it moves in its scanning pattern across the scanning zone. Independent claims 1 and 14 are amended herein to reflect the scanning pattern nature of the concentrated light beam. Independent method claim 21 calls for the concentrated light beam to be scanned in a scanning pattern across a scanning zone of a given width such that the products are impinged by the light beam as they pass through the scanning zone.

The base reference Riemer '086 is a video camera system and does not utilize a scanning light beam that directs a concentrated light beam across the width of a scanning zone in a scanning pattern. Referring to Fig. 1 of Riemer '086, a light source 18 is indicated. The '086 patent describes this light source as follows: "Generally lighting 18 is also provided. Lighting requirements, as known in the art, will change for each application." The general lighting 18 simply illuminates the field of view of the video cameras 20 and 30.

Independent claims 1 and 14 also call for a first detector having a field of view that is larger than the light beam cross-sectional area and is sensitive to the direct and diffuse reflected light from the products. This first detector generates a first signal corresponding to the direct and diffuse reflected light. A second detector is provided having a second field of view that is generally about equal to the cross-sectional area of the light beam. The second detector is sensitive to substantially only the direct reflected light from the products and generates a second signal corresponding thereto. Such first and second detectors are not utilized by the device of Riemer '086.

The system of Riemer '086 is a video system that operates according to the principle of viewing an entire object with a first video camera having a wide field of view and analyzing the scanning picture to identify the location of any potential targets for further visual inspection. A second camera having a higher magnification is then directed to the particular target locations for a higher resolution inspection of the target locations. As explained, at column 7, lines 55 through 64, the second camera 30 is configured with a movable scanner 32 that directs the field of view of the high resolution camera 30 anywhere in the object field of the larger object. Thus, it is readily apparent that the system of Riemer '086 does not utilize a first detector having a field of view larger than the general illumination light source 18 and a second detector having a second field of view generally equal to the area of the light source 18. The system of Riemer '086 is based on video imaging principles wherein a first video image is used to generate target locations on an object to which a second video and associated scanner are then directed for further high resolution imaging. The system is not based on analyzing the different components of diffused and reflected light from a concentrated light beam that is directed onto the objects to be scanned in a repeating scanning pattern.

Claim 1 further calls for control circuitry to be in communication with the first and second detectors and to generate control signals based on either of the first and second signals individually or as a function of a difference of the signals. Independent claim 14 specifically calls for the control circuitry to generate a sorting control signal based on a difference between the first and second signals. As explained above, Riemer '086 does not utilize control circuitry that detects and measures direct reflected light and diffuse

reflected light and generates sorting signals based on either the diffuse or reflected light signals individually, or a difference between the signals. The claimed control circuitry is fundamentally different from the imaging control circuitry used in Riemer '086.

The method of independent claim 21 is based on the scanning and detection principles discussed above, and particularly calls for scanning a concentrated light beam across the path of moving products in a scanning pattern so that all of the products are impinged by the light beam as they pass through the scanning zone. The reflected light from the products is split into to reflected beams. One of the reflected beams is detected by a first detection device that is sensitive to all of the reflected light from the products (diffuse and direct reflected light) and generates a first signal proportional thereto. The other split beam is detected with a second detection device that is sensitive to substantially only the direct reflected light from the products and generates a second signal proportional thereto. The signals are used to control a removal device to remove unwanted objects or irregularities from the mass of moving products with either of the first and second signals individually, or a difference between the first and second signals. As set forth above, such a process is fundamentally different from that disclosed and set forth in Riemer '086.

In the rejection of independent claims 1 and 14 in view of Riemer '086, the Examiner stated: "Since Riemer discloses the size of the field of view of the first and second detectors, it would have been obvious a design choice to select any size of the field of view for the detectors to inspect different objects. The modification involves only routine skill in the art." As discussed above, simply modifying or changing the field of use of the first and second video cameras in Riemer '086 would not produce a system

in accordance with the present invention. The inventive and unique operational principles of the present invention are fundamentally different from a video imaging system wherein a first low resolution picture of an entire object is used to direct the field of view of a second high resolution camera to target locations on the object, in accordance with Riemer '086.

Accordingly, applicants respectfully submit that independent apparatus claims 1 and 14 are allowable over the base reference Riemer '086. Claims 2 through 13 only further patentably define the combination of claim 1 and are thus also allowable. Likewise, claims 15 through 20 only further patentably define the unique combination of claim 14 and are thus allowable.

Claim 21 stands rejected in view of the combination of the base reference Riemer '086 and Lockett '062. In particular, Lockett is cited as disclosing a beam splitter in front of first and second sensors. Such a beam splitter would not be used in the system according to Riemer '086 before the first and second video cameras. Such an arrangement would defeat the very operational principles of Riemer '086. Claim 21 is allowable for essentially the reasons set forth above with respect to claims 1 and 14. Lockett '062 does not rectify the deficiencies noted above with respect to the base reference Riemer '086.

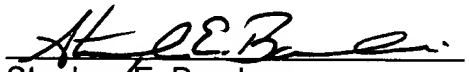
Accordingly, applicants respectfully submit that claim 21 is allowable over the cited art. Claims 22 through 32 only further patentably define the invention of claim 21 and are thus also allowable.

With the present Amendment, applicants submit that all pending claims are allowable and that the application is in condition for allowance. Favorable action

thereon is respectfully requested. The Examiner is encouraged to contact the undersigned at his convenience to resolve any remaining issues.

Respectfully submitted,

DORITY & MANNING, P.A.

By: 

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## Claim Worksheets for 09/686,581 (BST-2)

1. (Amended) An apparatus for detecting irregular or foreign objects in products moving through a scanning zone, said apparatus comprising:

a light source, said light source directing a concentrated light beam having a given cross sectional area in a scanning pattern towards a scanning zone wherein said products move through said scanning zone and are impinged upon by said light beam moving in said scanning pattern, said light being directly reflected from generally the impingement point of said light beam on said products and diffusely reflected from an area around said impingement point due to diffusion of said light beam into said products;

a first detector disposed to receive reflected light back from said products, said first detector having a first field of view larger than said light beam cross sectional area wherein said first detector is sensitive to substantially all of said direct and diffused reflected light from said products and generates a first signal corresponding thereto;

a second detector disposed to receive reflected light back from said products, said second detector having a second field of view generally equal to said cross sectional area of said light beam wherein said second detector is sensitive to substantially only said direct reflected light from said products and generates a second signal corresponding thereto; and

control circuitry in operable communication with said first and second detectors to receive said first and second signals and generate control signals based on either of said signals individually or a difference of said signals.

10. (Amended) The apparatus as in claim 1, further comprising a rotating multi-faceted mirror disposed between said light source and said scanning zone, said multi-faceted mirror directing said light beam in [a] said scanning pattern across the width of said scanning zone.

14. (Amended) An apparatus for sorting products moving through a detection zone wherein irregularities or foreign objects in the products are detected and removed, said apparatus comprising:

a light source, said light source directing a concentrated light beam having a given cross sectional area in a scanning pattern towards a scanning zone wherein said products move in a mass through said scanning zone and are impinged upon by said light beam moving in said scanning pattern, said light being directly reflected from generally the impingement point of said light beam on said products and diffusely reflected from an area around said impingement point due to diffusion or scattering of said light beam into said products;

a first detector disposed to receive reflected light back from said products, said first detector having a first field of view larger than said light beam cross sectional area wherein said first detector is sensitive to substantially all of said direct and diffused reflected light from said products and generates a first signal corresponding thereto;

a second detector disposed to receive reflected light back from said products, said second detector having a second field of view generally equal to said cross sectional area of said light beam wherein said second detector is sensitive to substantially only said direct reflected light from said products and generates a second signal corresponding thereto;

control circuitry in operable communication with said first and second detectors to receive said first and second signals and generate a first sorting control signal based on a difference between said first and second signals, said first sorting control signal corresponding substantially to only said diffused reflected light; and

a plurality of air ejectors disposed below said scanning zone and extending across a path of movement of said mass of products, said air ejectors actuated by said control signal to remove unwanted objects from anywhere within said mass of products.